

Tracker for the Mu2e Experiment at Fermilab

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The Mu2e experiment will search for neutrinoless conversion of muons to electrons using an intense muon beam stopped in an aluminum target. The signature is an electron with energy nearly equal to the muon mass. Precise and robust measurement of the outgoing electron momentum is an essential element to the experiment. We describe the design of a low mass tracking system to meet this requirement. The tracker must operate in a vacuum and a 1T magnetic field. We have chosen to use ~20K thin wall Mylar straws held under tension to avoid the need for supports within the active volume. In addition to measuring distance from the wire by drift time, sub nanosecond measurement of signal propagation time is used to measure position along the wire. Charge is measured using ADCs to provide particle identification capability. To minimize the number of vacuum penetrations, digitization is performed on the detector. Readout uses a triggerless, streaming architecture with data transmitted on optical fiber.

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